

REMARKS/ARGUMENTS

Claims 1-31 were previously pending in the application. Claims 1-7 and 19 are canceled, with claims 1-7 being directed to the non-elected invention; claims 8, 10, 12, 20, 21, and 27 are amended; and new claims 32-33 are added herein. Assuming the entry of this amendment, claims 8-18 and 20-33 are now pending in the application. The Applicant hereby requests further examination and reconsideration of the application in view of the foregoing amendments and these remarks.

Drawings:

The Applicant submits herewith a Transmittal of Corrected Drawings, in which Figs. 2A and 4 are amended to correct inadvertent label omissions. Support for these corrections can be found, e.g., on page 4, line 22; page 5, line 4; and page 6, lines 4, 10, and 17.

Specification:

On page 2 of the office action, the Examiner objected to the abstract for being too long. In response the Applicant has amended the abstract, which is now 147 words long.

Claim Rejections and Objections:

On page 2 of the office action, the Examiner rejected claims 8, 10-11, 18, and 27-30 under 35 U.S.C. § 102(e) as being anticipated by Brown. On page 4, the Examiner rejected claims 9, 12-17, 19-21, 24-26, and 31 under 35 U.S.C. § 103(a) as being unpatentable over Brown in view of Costello. On page 7, the Examiner objected to claims 22-23 as being dependent upon a rejected base claim, but indicated that those claims would be allowable if rewritten in independent form. For the following reasons, the Applicant submits that all now-pending claims are allowable over Brown and Costello.

Amended claim 8 is directed to a MEMS device having: (i) a rotatable mass suspended at a first offset distance from a substrate and (ii) an upright spring coupled between the rotatable mass and the substrate. The rotatable mass is a part of a motion actuator adapted to move said mass with respect to the substrate. The upright spring and the motion actuator enable rotation of the rotatable mass about a rotation axis offset from the substrate by a distance greater than the first offset distance. Support for the amendment of claim 8 can be found, e.g., in original claim 19 (now canceled).

Brown discloses a MEMS grid-array connector. Since the grid-array connector of Brown does not have a motion actuator and requires the application of an external force (see, e.g., page 4, paragraph [0047]), Brown cannot possibly teach at least the limitations that explicitly recite the "motion actuator" in claim 8. The Applicant submits therefore that the rejection of claim 8 under § 102 has been overcome.

Costello discloses various MEMS devices, with the two devices relied upon in the claim rejections shown in Costello's Figs. 1A-D and 2A-B, respectively. The device of Figs. 1A-D is a tunable optical filter having two substantially parallel plates **152** and **162**, with the distance between the plates affecting the light interference pattern between the plates and therefore filter characteristics. Each of the plates can be moved with respect to the substrate substantially independent of the other plate, by biasing the respective vertical comb actuators coupled to the plate. Costello explicitly specifies that plates **152** and **162** are adapted to translate with respect to the substrate in the vertical direction (see, e.g., col. 3, lines 30-42) and does not specify that plates **152**

and 162 are adapted to rotate with respect to the substrate. For example, plate 152 is electrostatically coupled to stator 156, which is symmetrically disposed on two opposite sides of the plate. As explained by Costello, when stator 156 is biased, plate 152 is translated with respect to the substrate along the Z direction, and not rotated. The same is true for plate 162, which is electrostatically coupled to stator 166, which is symmetrically disposed at two opposite sides of that plate. As such, Costello does not teach or suggest rotation for plates 152 and 162, nor does the actuator structure of Costello's Fig. 1 enable such rotation.

The device of Costello's Figs. 2A-B is an optical router having a rotatable mirror 210, which is used to route light between different optical fibers. Mirror 210 rotates with respect to the substrate when stators 206a and 206b are biased to move in opposite directions along the Z axis. This stator motion causes mirror 210 to rotate about an axis defined by torsional springs 214, each of which is attached between the mirror and a respective support structure 202. Costello explicitly specifies that springs 214 are narrow pieces of silicon made of the same silicon layer as mirror 210 (see col. 3, lines 56-60). As such, the rotation axis defined by springs 214 has at most the same offset distance from the substrate as mirror 210. The Applicant submits therefore that Costello does not teach or even suggest a spring and a motion actuator that enable rotation of the mirror about a rotation axis offset from the substrate by a distance greater than the offset distance of the mirror.

To summarize, Brown and Costello, independently or in combination, do not teach or suggest at least the limitation of "wherein the upright spring and the motion actuator enable rotation of said mass about a rotation axis offset from the substrate by a distance greater than the first offset distance." It is therefore submitted that claim 8 is allowable over Brown and Costello. Since claims 9-18 and 20-26 depend variously from claim 8, it is further submitted that those claims are also allowable over Brown and Costello.

Amended claim 12, which depends from claim 8, further specifies that the device has a structure mounted on the rotatable mass and positioned at a second offset distance from the substrate greater than the first offset distance, wherein the structure is mechanically connected to move together with the rotatable mass. Support for the amendment of claim 12 can be found in Applicant's Fig. 2A and the associated text.

The Applicant submits that the cited references do not teach or suggest a combination of features recited in claim 12. In particular, the Applicant directs the Examiner's attention to Costello's Figs. 1C-D. If plates 152 and 162 are interpreted as examples of the "structure" and the "rotatable mass," then the limitation of "wherein the structure is adapted to move together with the rotatable mass" is not met because, as already explained above, plates 152 and 162 are designed to move substantially independent of one another to enable variability of the distance between the plates. These facts provide additional reasons for the allowability of claim 12 over the cited references.

Amended claim 27 is directed to a MEMS device having an upright spring supported on a substrate. The upright spring has two segments joined at one end of the spring and disjoint at another end of the spring. One disjoint segment end is coupled to the substrate and the other disjoint segment end is adapted to move with respect to the substrate. The end of the spring having the joined segments is an unattached end. Support for the amendment of claim 27 can be found, e.g., in Applicant's Fig. 2A and the associated text.

The Applicant submits that the cited references do not teach or suggest a combination of features recited in claim 27. In particular, the Applicant directs the Examiners attention to Brown's Figs. 3-5 referred to by the Examiner in the rejection of claim 27. These figures clearly show that the springs disclosed by Brown do not have any unattached ends in the final device assembly.

For all these reasons, the Applicant submits that claim 27 is allowable over the cited references. Since claims 28-31 depend variously from claim 27, it is further submitted that those claims are also allowable over the cited references. Furthermore, the same reasons that make claim 27 allowable over the cited references also serve as additional reasons for the allowability of claim 10.

New claim 32 is equivalent to original claim 22 rewritten in independent form. Since the Examiner stated that claim 22 would be allowable if rewritten in independent form, the Applicant submits that claim 32 is allowable. New claim 33 is equivalent to original claim 23. Since claim 33 depends from claim 32, it is further submitted that claim 33 is also allowable.

In view of the above amendments and remarks, the Applicant believes that all now-pending claims are in condition for allowance. Therefore, the Applicant believes that the entire application is now in condition for allowance, and early and favorable action is respectfully solicited.

Respectfully submitted,

Date: 11/16/05

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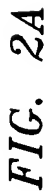
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VIEW OF
FIG. 2C

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FIG. 3

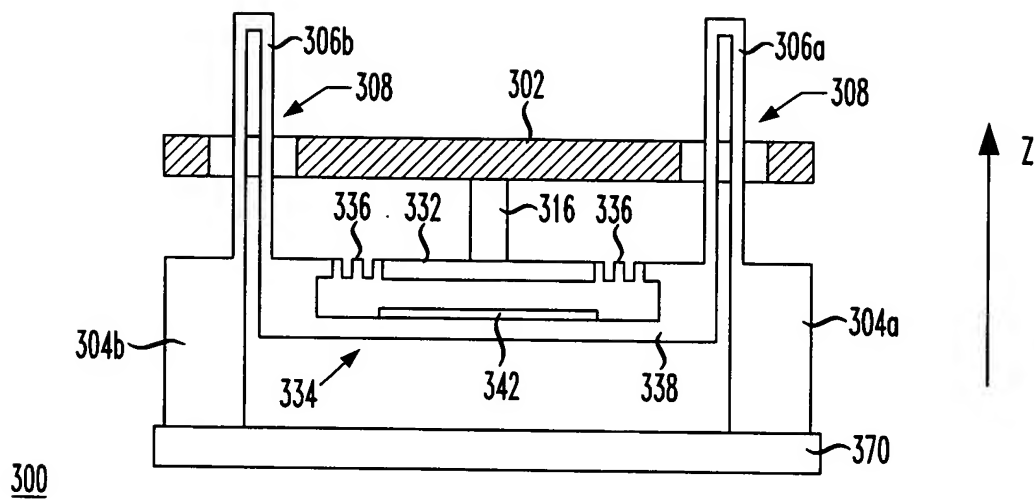


FIG. 4

